Subject: glowbugs V1 #237
glowbugs Wednesday, February 4 1998 Volume 01 : Number 237

Date: Tue, 3 Feb 1998 16:35:10 -0500 (EST)
From: rdkeys@csemail.cropsci.ncsu.edu
Subject: Re: How are CW output power and input power and PEP related?

> Bob, your description of an RF voltmeter is a *peak* reading meter!!!
> There are 2 sets of circuits in the figure (My book is 1977, but should be
> the same as your 1969). The top ones without capacitors give a good
> approximation to average voltage. Notice from the drawings that this is
> AVERAGE and *NOT* RMS. The 2 are different!! The circuits at the bottom
> of the figure use capacitors and give *PEAK* readings.

OK, this is what I was a little confused on. I was thinking the meter was
an average reading meter and needed another multliplication again.

If it is peak, then that fulfills the requirement for the calculations,
although a DVM or oscilloscope is a little better in that it does not
load the measurement down a little.

> The main source of error is the slight
> droop in the voltage due to the loading of the microammeter. Using a DVM
> or VTVM as the readout will give more accurate peak readings. It will also
> give a longer time constant so you can actually read the meter before the
> voltage falls off.

A DVM or VTVM is always better, but I was thinking with Simeon Simpleton's
hat on again, and trying to do it with the KISS approach. What would be
an error estimate comparing a diode/100ua meter vs a DVM or VTVM? If it
was within 5% or so or even 10%, I would not quibble. That much could
be easily calibrated against.

> I did some quick calculations to see how important the diode drops are in the
> calculation. At 10 W PEP the peak voltage in a 50 Ohm system is 22 Volts.
> At 1500 W PEP the peak voltage is 193 volts!!! Better use some hefty diodes
> and resistors in that meter. Or better yet, use a 20 dB T pad attenuator
> ahead of the meter.

By reverse calculation on CW, then 1500 W PEP would be 7.75A and
625 W PEP would be 5.00A and
500 W PEP would be 4.47A and 160/80/40M
425 W PEP would be 4.12A and 30M
200 W PEP would be 2.83A and
100 W PEP would be 2.00A and
50 W PEP would be 1.41A, etc,

(based upon the formula PEP = (I x I x 2)/50 for use with a current meter).

Thus a 0-5 A RF ammeter would suffice for the 500W PEP limits on 160/80/40M
(and 30M too), if it were calibrated in PEP at 50 ohms. The ammeter
is less hassle on a CW signal, but the voltmeter would be required
on SSB. The RF ammeter would not measure well below 1 amp, though,
usually.

Yes, the ARRL meter was calibrated up to 500 volts, if memory serves me correctly. For purposes of satisfying OET65/OET65B requirements, a meter with a range of 0-500 watts PEP capability suffices to keep the power under the RF exposure limits of 500 watts PEP on 160/80/40M and 425 watts PEP on 30M. Those are the most common glowbugging frequencies I would expect, and the ones we need to be mindful of. I like the idea of a simple 0-5A RF meter in the line somewhere to monitor that for CW use.

I was thinking of taking a generic 100ua meter movement and setting it up for that by taking a divider network off the SWR meter box with a simple 10K or larger switcheable divider network to the rectifier bridge and then to the meter movement. Calibrated against a Byrd meter into the dummy load and I would expect it would work fine for my minimal needs. In principle, one should also be able to take the SWR FWD line and do the same thing directly off the existing network. The SRT-14 has a neat outboard SWR power box that measures RF amps and swr directly. I had thought of calibrating that for PEP with an external meter. When all that is said, I still favor taking the simple 0-5 RF ammeter with a calibration scale of 0-5 amps and 0-625 watts PEP on the same meter face. Something to be said for 1 part simplicity.

> In the old days we were limited to 1000 W DC input for the carrier.
> If we got 60% efficiency, we had 600 W RMS (1200 W PEP) out just for the
> carrier! When you add another 1200 W PEP for the modulator power, we were
> getting 2400 W PEP for AM when going full out and staying legal.

It was so easy then. Read the plate current and voltages and comply.

For low power work (0-100 watts) I usually read a military power meter dummy load that I picked up long ago. But for the 100-500 watt range, I need to come up with something else. A Byrd wattmeter is nice, but I have lots of RF ammeters and small DC uammeters around to play with, so I wanted to give those a whirl on the SRT-14 sized things. On Big Bertha Radiomarine, it will take a calibrated RF voltmeter probe or O-scope since she runs higher impedance antennae and not the usual 50 ohmish things.

> Today with the 1500 W PEP limit, we are limited to 375 W RMS of carrier.
> Obviously, those of us who like Admirable Modulation got stuck with a
> sizeable power drop with the new regulations.

375 watts.... oh well, there goes the big RCA AM Broadcast rig out the door.....(:+}}.....

> Ray Mack

Thanks Ray.... sometimes the obvious is only muddy clear.....

Bob/NA4G

Date: Tue, 3 Feb 1998 14:40:51 -0600
From: mack@mails.imed.com (Ray Mack)
Subject: Dummy Load??

I was doing the numbers for the PEP power question and I discovered that at 1500 W PEP the voltage across 50 Ohms is 193 V. It turns out that 117 V RMS is 165 V Peak.

These numbers are fairly close, so I pulled out the DVM and the 1500W ceramic heater. Surprise! the resistance is 50.44 Ohms at room temperature. These resistors are positive Tempco resistors so I don't know what happens when they get hot. I also don't know what the AC characteristics are, but I'll let you know when I get a chance to get on the network analyser.

Ray Mack
WD5IFS
mack@mails.imed.com
Friendswood, (Houston), TX

Date: Tue, 3 Feb 1998 15:01:50 -0600
From: mack@mails.imed.com (Ray Mack)
Subject: More PEP stuff

Bob:

<snip>

> The main source of error is the slight
> droop in the voltage due to the loading of the microammeter. Using a DVM
> or VTVM as the readout will give more accurate peak readings. It will also > give a longer time constant so you can actually read the meter before the
> voltage falls off.

A DVM or VTVM is always better, but I was thinking with Simeon Simpleton's hat on again, and trying to do it with the KISS approach. What would be an error estimate comparing a diode/100ua meter vs a DVM or VTVM? If it was within 5% or so or even 10%, I would not quibble. That much could be easily calibrated against.

<snip>

I had my typing going faster than my brain again. The droop with a meter movement is managable. You can control the time constant by simply using larger capacitors. It is really as simple as a time constant calculation. A 0.001 uF with a 10 Meg VTVM is the same as a 5 K meter movement with 100 K in series (to make it a voltmeter) and 0.1 uF of capacitance.

As Rosanne Rosanandanna would say: "Never mind!"

Ray Mack
WD5IFS
mack@mails.imed.com
Friendswood (Houston), TX

Date: Tue, 3 Feb 1998 17:13:08 -0500 (EST)
From: rdkeys@csemail.cropsci.ncsu.edu
Subject: Re: How are CW output power and input power and PEP related?

> Power in all output power measurements is RMS power, where the average
> is over a time long compared the RF frequency but short compared
> to the modulation frequency. For CW, since the the power is
> (nominally) not varying with the key down, the output power is just
> the RMS power of the carrier while the key is down. A simple power
> measuring meter calibrated for RMS power will get the job done. I
> am assuming there that there is no significant higher power chirp
> on the leading or trailing edge of the key actuation (if there is
> you have something to repair in any event).

Chirp would not count, since the time constant of measurement of say
10-100 cycles would be lots faster than my chirp. But, I know what
you are saying. The terminology from what I read in the rules and
what I have been doing over the years is not always exactly tit for tat.
That was making me think it over again, just to be sure. I will assume
on/off time duty cycle is unimportant in what they are calling PEP as
would relate to a CW rig. In calculating the RF exposure limits, then
it comes into play at what seems to be a 40% duty cycle timing, for what
they term ``conversational CW''.

> For the AM and SSB modes, the RMS output power varies with time at the
> audio frequency rate. The Peak Envelope Power (PEP) is the RMS output
> power at the peak of the modulation envelope. To reliably measure this you
> will need an oscilloscope. In your terms it is
> (Epeak * Epeak)/(R * 1.414) where Epeak is peak voltage at the highest
> point in the modulation envelope. If the measuring device used to
> measure Epeak is already calibrated in RMS, then you don't divide by
> the extra sqrt(2). The FCC note you saw probably was speaking from
> the point of view that Epeak was the RMS peak.

This is another of those points that needs to be clarified. I was assuming
the FCC was meaning Epeak was the peak voltage at the largest excursion of
the period of measurement. On AM or SSB that would be the largest voice
modulation excursion peak. On CW that would be the sine wave peak, I am
assuming. The RMS would be .707 Epeak if I am remembering correctly.
I am assuming that the FCC means the sine wave peak in CW to be the same
as the voice modulation peak in AM or SSB, in terms of measuring what
they call PEP as relates to amateur transmitter output power, correct?

> As you indicate, oscilloscopes are not always handy. It is possible
> to cobble a "peak reading voltmeter" that will pick off the the peak
> of a suitably rectified sample of the RF output of a rig, and calibrate
> it using an oscilloscope. By the time you have cobbled such a thing
> you might as well have bought a used oscilloscope, and the scope will
> have many more useful functions in addition to power measurement.

In my shack, which is smaller than an old submarine shack (and packed
with more equipment) a big old Dumont scope won't fit anymore. On the
line patch panel, I have room for a small box or two with meters to
measure RF current and RF voltage. I was thinking that I could do
that if I could calibrate the meters accurately, in lieu of a big
old oscope. Calibration of RF ammeters would be trivial if the proper

mathematical function were applied. That was one thing I was after,
and for some reason, my algebra went out the door, making me think
twice as hard to be sure I was not factoring in something wacko. That
would be a simple approach. A calibrated RF voltmeter would be a more
complex approach and require calibrating rather than just rescaling.
It would be a small sized project that could be put on the patch panel.
A VTVM would work, but that would not be good out on the operating position.
An oscope would be out of the question in the present shack, except maybe
on the bench on the other side of the room.

> Of course, a real glowbug will have an old scope with nothing but
> tubes in it...

An OS/8 might be as big as I could fit presently. Old Dumonts do have
that nice comfy glow, though. Actually, in 30 years, I have only needed
an oscope about 5 times to do anything, the rest can be done with other
methods, even working on the old SRT-14's synthesizer or R-390's. If
I had to put big money out, I would opt for a modern scope and a modern
counter. But, the point of the discussion was to see how simply it could
be done. I think the rescaled RF ammeter is just the trick for the
average glowbugge station.

Bob/NA4G

Date: Tue, 3 Feb 1998 17:20:17 -0500 (EST)
From: rdkeys@csemail.cropsci.ncsu.edu
Subject: Re: Dummy Load??

> I was doing the numbers for the PEP power question and I discovered that at
> 1500 W PEP the voltage across 50 Ohms is 193 V. It turns out that 117 V
> RMS is 165 V Peak.
>
> These numbers are fairly close, so I pulled out the DVM and the 1500W
> ceramic heater. Surprise! the resistance is 50.44 Ohms at room
> temperature. These resistors are positive Tempco resistors so I don't know
> what happens when they get hot. I also don't know what the AC
> characteristics are, but I'll let you know when I get a chance to get on
> the network analyser.

Now, does that mean we can use that 1500 watt ceramic heater for a
dummy load?

(I would expect yes at any frequency up to 10 mhz or so, provided it
did not resonate at any desired operating frequency). Hmmmm, new dummy
load thingies to play with, suitable for all types of glowebugges.

OK, then, run us off a calibration table for 0-1500 watts PEP on
a 0-10A RF ammeter scale by 1 amp increments into your heater!

Mebbie there is some methode to our maddeness.....

Ain't glowbuggin' fun.....

Bob/NA4G

Date: Tue, 3 Feb 1998 17:47:00 -0500
From: "Ornitz, Barry L" <ornitz@eastman.com>
Subject: RE: How are CW output power and input power and PEP related?

As usual, Bob Keys asked some questions that, while seemingly simple, are really somewhat more complex. Thanks, Bob!

The real KEY (no pun intended) is to understand the relationships between peak, average, and RMS (root mean square) values of a waveform. You absolutely HAVE to know the shape of the waveform being measured to relate these values to each other. Another important point to remember is that you must be sure of your definitions before starting.

To begin, I believe Bob is misreading the Office of Engineering & Technology bulletin. The FCC defines PEP (peak envelope power) in 47CFR2.1:

> Peak Envelope Power (of a radio transmitter). The average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions.

Some points to note are that the power is the AVERAGE power for one cycle, and that the cycle is the one at the crest or PEAK of the modulation waveform.

In CW (100HA1A), the crest of the waveform is when the key is down. The PEP output for a CW waveform is the same as the power output with the transmitter keyed continuously. If you could see the waveform during the crest, it would look like a sine wave with a peak voltage. The RMS value of this sine wave would be used for calculating the PEP. Since this one cycle is a sine wave, its RMS value is 1/SQRT(2) of its peak value. With a load of known resistance, the PEP may be calculated:

$$PEP = Erms*Erms/R = Epk*Epk/R/2$$

This answers half of Bob's first question - PEP and average CW output power are identical. It also answers the second question - no.

For question 3, you need to realize that an RF ammeter is really a small resistor with an attached thermocouple. The thermocouple output drives the meter movement. The thermocouple output is nonlinearly proportional to its temperature which is, in itself, a very nonlinear function of the RF power applied through the resistor. Since we are looking at the thermal effect of the RF current, the reading is generally proportional to RMS current - but the calibration may be whatever! Since RF ammeters were never very accurate instruments anyway (sensitive to ambient temperature, panel mounting, frequency, etc.), they are rarely seen today. The older units may be calibrated in RMS amps, average amps, or ??? - usually with no way of telling from the faceplate! If you have nothing else, an RF ammeter may be used but you really should check its calibration.

An RF voltmeter is really a pretty trivial instrument to build - if you have the right kind of diode to rectify the signal. Ordinary silicon power rectifiers have trouble rectifying much above a hundred kHz or so. Fast recovery silicon rectifiers can go to a MHz or two. But remember these devices have far too much capacitance to be good RF signal rectifiers. Small signal rectifiers like the 1N914 or 1N4148 (about $0.10 each) do pretty well but have peak voltage limitations of 50 to 75 volts.

Using tubes is a different approach. High peak voltages can be withstood easily enough, but tube rectifiers still make poor signal diodes. The ubiquitous 5U4 or 5Y3 is a poor performer much above even a kHz. The 1B3 high voltage diodes used as rectifiers in TV flyback circuits are rated only to a hundred kHz or so. For a tube rectifier, I suggest the 6AL5 twin diode. It is rated quite high in frequency and has a reasonable peak voltage rating. I do not have any tube books here at work, but if memory serves, you will be pushing one somewhat if you need to measure a kilowatt. (*)

However, the 6AL5's have always seemed to survive when I used them - and they are cheap. Connect the plate to the dummy load (plate capacitance is pretty tiny), connect the cathode to the filament using an isolated secondary transformer. The transformer capacitance to ground can be

enhanced with an extra 0.001 uF capacitor from the cathode to ground. Measure the cathode voltage with a high impedance meter (like a VTVM or DVM) and you will be measuring PEAK RF voltage. In fact, it will be difficult to measure anything BUT peak since even stray capacitance makes the circuit a capacitor input power supply.

With a high impedance load, you can ignore the forward voltage drop in both tubes and silicon diodes. Remember that at zero forward current, the forward drop is zero (actually with a tube, you need to worry about space charges but these can often be ignored).

If you need an RF voltmeter that will work with other waveforms than just CW, use more capacitance to filter the output voltage. A 0.25 to 0.5 uF capacitor will give a suitable time constant with an 11 megohm input VTVM. The FCC gives the required specifications of the input signals (two tones on SSB, for example) in 47CFR2.985. Just remember the RF must be there long enough to fully charge the capacitors.

To compare AM to CW, remember that at the crest of the modulation cycle, the voltage is twice that without modulation. Thus the PEP of an AM signal would be four times that of the carrier alone. So the newer measurements prevent the old time kilowatt-carrier plate-modulated AM rigs from being used today at full power.

For simple waveforms like several sine waves, SSB PEP values may be calculated without too much difficulty. For speech, however, throw all the calculations out since the PEP to average ratio is different for everyone's speech. Add some voice processing like clipping, ALC, or such and things get worse enough that actual measurements are required.

(*) Since we have a capacitor input filter, the 6AL5 sees the sum of the DC and the RF voltage as its peak reverse voltage. I usually wire both sections in parallel. My guess is that a 6H6 would be more Bob's era than the 6AL5! :-)

73, Barry L. Ornitz WA4VZQ
ornitz@tricon.net

Date: Tue, 03 Feb 1998 13:34:12 -1000
From: Peter Demmer <ampruss@hits.net>
Subject: Re: 3579 QRG, last night.

Ken Gordon wrote:
>
> Worked Jack, W7QQQ, and his beautiful sounding 813 crystal oscillator last
> night (Monday). Band conditions not too hot. He had LOTS of static, and
> my 50 watts were difficult copy for him. HE was 579x here. Also heard
> W7ZFB later in the evening, but he didn't hear me, and N4QY, same story.
>
> Several other un-identified signals tuning up at various times, which
> would have been Q-5 copy here.
>
> It was good to hear the activity.
>
> Ken W7EKB
Peter wrote;

Greetings again Ken; What time are you guys glowing from across the
pond? Aloha, Peter, KH6CTQ.

Date: Tue, 03 Feb 1998 15:36:32 -0800
From: "Eugene D. Brooks III" <brooks3@llnl.gov>
Subject: Re: How are CW output power and input power and PEP related?

At 5:13 PM -0500 2/3/98, rdkeys@csemail.cropsci.ncsu.edu wrote:
>Chirp would not count, since the time constant of measurement of say
>10-100 cycles would be lots faster than my chirp. But, I know what
>you are saying.
Suppose that when you hold the key on a CW transmitter down
the output power soon stabilizes to 200 watts, but when the key
is initially pressed there is one cycle for which the power level
is 210 watts (in a novice band). According to the FCC definition,
your PEP for this transmission is 210 watts, not 200 watts. Needless
to say, the FCC has much more important rules violations that they
don't chase down. I only point this out because it illuminates
that the definition of PEP means.

>I will assume
>on/off time duty cycle is unimportant in what they are calling PEP as
>would relate to a CW rig.
With regard to PEP measurements, the on/off duty cycle is not
important. Only the RMS power of the highest power RF cycle counts.

>In calculating the RF exposure limits, then
>it comes into play at what seems to be a 40% duty cycle timing, for what
>they term ``conversational CW''.

I have not read through the shot and shell with regard to the

RF exposure limits, but it is obvious that duty cycle counts here.
Damage to tissues arises mainly from RF heating competing with the
capacity of the body to carry away the heat from the affected tissue.
The averaging must be done over the time constant characteristic
of this process, so duty cycle counts. In this case RMS power
over the duration of the transmission is what counts, not PEP.

>This is another of those points that needs to be clarified. I was assuming
>the FCC was meaning Epeak was the peak voltage at the largest excursion of
>the period of measurement.
There are people at the FCC who write memos/notices who don't
know what they mean, or worse...

>On AM or SSB that would be the largest voice
>modulation excursion peak. On CW that would be the sine wave peak, I am
>assuming. The RMS would be .707 Epeak if I am remembering correctly.

For a sine wave, which is a safe enough assumption for AM, SSB, or CW
operating at RF frequencies modulated by nothing faster than AF
frequencies, the RMS voltage is .707 times the instantaneious
peak voltage seen on say an oscilliscope.

>I am assuming that the FCC means the sine wave peak in CW to be the same
>as the voice modulation peak in AM or SSB, in terms of measuring what
>they call PEP as relates to amateur transmitter output power, correct?
The FCC, with its is definition of PEP, places an upper bound on
the instaneous RMS (read that is DC equivalent) power that may be legally
emitted by a transmitter. The rule, as far as average (measured over
a much longer time span) power is concerned, has different consequences
for different modulation modes.

For CW, if one is holding the key down, the PEP is the same as
the total power that would be heating up a dummy load if one had
the transmitter connected to one.

For SSB, supposing you modulated with a 1000 HZ audio wave with
the output pegged to the PEP limit, the total power heating the
dummy load would be the same as the CW transmitter running at
the same PEP level. Note that such an SSB signal is just a clean
constant RF signal offset 1000 HZ from the missing carrier...

For FM, neglecting sideband effects, a signal with the same PEP
limit would have the same heating power as the CW transmitter
with the key down.

AM modulation, at 100% modulation with a 1000 HZ, or any other
tone, is different. The PEAK envelope power is the same as
the CW transmitter with the key down, but this varies from
maximum to zero with the shape of the 1000 HZ audio sine wave.
The average is one half, so it will heat that dummy load as
if you had a 50 watt CW transmitted with the key down.

With regard to meter utility, a RMS calibrated RF watt meter
will probably be as good as you need to be, and if you really
want to get it right you build the "modulation detector circuit"
in Orrs Radio Handbook and then attach a peak reading voltmeter to
it.

With all this glow bug interest, I am regretting tossing out all my
old collected equipment before I went to college years ago...

Regards,
Eugene

- --

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Date: Tue, 3 Feb 1998 23:13:41 -0500 (EST)
From: "Roberta J. Barmore" <rbarmore@indy.net>
Subject: Re: How are CW output power and input power and PEP related? (fwd)

Hi!

On Tue, 3 Feb 1998, Conard Murray wrote:
> When I have used the hot wore ammeters for power measurement and then
> compared results with a wattmeter, I find I get the proper reading assuming
> the meter is reading peak current rather than rms current

Ahh, but what does your wattmeter read? Some ham meters measure PEP; Bird Thruline (et lab & service-grade cetera) wattmeters measure average power. (The fancy ones can measure *anything,* but a plain ol' Bird 43 with stock slugs reads average).

On the other hand, the RF ammeters in my misspent youth of herding electrons around MW BC station were RMS-reading instrments.

Now it sez here that (for clean sine waves!) Vavg = Vrms * 0.9003, a factor which reads "about the same" for casual work; so an average-reading wattmeter vs. an RMS-reading RF ammeter and the P equals I-squared R crank-through will give you close numbers on CW. (That avg-rms fudge factor holds for current, too, of course).

Shove speech through the system and you start to be at the mercy of meter ballistics and other fun things--too many unkowns here to make a good prediction.

> Anyone know if these RF ammeters are calibrated in RMS or peak?

Well, it does sort of depend on how the scale was marked but in general, RF ammeters measure by heating something up (a hot wire inside that gets flexy, a thermocouple, a teeny-tiny politician, whatever) and thus the only always-honest scale markings are RMS; so most of 'em are marked that way. RMS is most literally a "how hot does it get?" measurement, and RMS power is sometimes referred to as "heating power."

Real low-range RF "ammeters" are often current-sqaured galvanometers, with a non-linear scale. Handy for tuning up QRP rigs in an old-fashioned manner, or checking crystal current...but not teriffically accurate.

Last but more generally, in re "PEP." Acronym means "Peak *Envelope* Power" and it says what it means and means what it sez: the highest excursion of the envelope with modulation, what Jan was calling "peak of peak." This is a mesurement thunk up by people who look at scopes a lot (preferably *storage* scopes so's they can get a good look). In practical terms, a condenser across the output of the detector to provide (with the meter & its multiplier resistor) such time constant as to not decay at a rate greater than the slope of the lowest modulating frequency will give ya PE V and a non-linear (V-squared) scale upon the face of the meter giveth PE P. This is how the trick is done in cheap switchable avg/PEP ham power meters. (Oh, were it only that easy for TV--the shenanigans we go through to calibrate the peak-reading reflectometers from an average-reading standard are simply annoying!*)

In even more practical terms, it means "get a peak limiter to run full-out AM 'phone." An old Top-40-style processing chain would be better still--a *gated* compressor driving a fast peak limiter, so that when you start to talk, you hit right to the PEP limt and stay there 'til you draw breath. (And the *gated* compresser lets you take a breath without suckin' in a lungful of speaker-cone at the far end: it flips over from compressing to expanding when the input level drops below a preset threshold. Don't leave home without it!). Umm, it will sound pretty rank, especially if you haven't got a quiet shack with passable acoustics.

73,
--Bobbi

_____

*(FWIW, "shenanigan" probably comes from a French phrase meaning "I dunno." The fudge-factors for TV power are "I dunno;" lotta math to swot 'em and probably handed down from on high engraved in photoelectric glop by Farnsworth & Zwyorkin).

Date: Wed, 04 Feb 1998 09:39:46 +0100
From: Jan Axing <janax@algonet.se>
Subject: Re: How are CW output power and input power and PEP related?

Jan Axing wrote:

[never mind]

Hmm...
Voltage = root
Current = root

Power = root x root

I should have known better myself...

The implication would be that a CW transmitter maximum allowed output
is 750 WRMS in US. Is that correct?

An AM transmitter 100% modulated would be limited to 187 WRMS carrier?

Jan, SM5GNN

Date: Tue, 3 Feb 1998 19:22:31 -0800 (PST)
From: Ken Gordon <keng@uidaho.edu>
Subject: Re: 3579 QRG, last night.

> Greetings again Ken; What time are you guys glowing from across the
> pond? Aloha, Peter, KH6CTQ.

Lessee...I think we first worked about 0130, then about 0230 I heard the
others. I often listen off and on until about 0500

Ken

Date: Wed, 4 Feb 1998 07:51:40 -0400
From: "Brian Carling" <bry@mnsinc.com>
Subject: Re: 3579 QRG, last night.

I got into anice QSO with W5TVW last evening on 3579 but the QRN was
DREADFUL!

I was using the Valiant and 2-C - we were going to try again later
but things came up here! (sorry!) FInally getting the stormy weather
after weeks of indian summer here in MD! ANd of course the QRN has
been merciless the psat few days, just like summer condx too!

On 3 Feb 98 at 11:03, Ken wrote:

> Worked Jack, W7QQQ, and his beautiful sounding 813 crystal oscillator last
> night (Monday). Band conditions not too hot. He had LOTS of static, and
> my 50 watts were difficult copy for him. HE was 579x here. Also heard
> W7ZFB later in the evening, but he didn't hear me, and N4QY, same story.
>
> Several other un-identified signals tuning up at various times, which
> would have been Q-5 copy here.
>
> It was good to hear the activity.
>
> Ken W7EKB
>
>

>
****
*** 73 from Radio AF4K/G3XLQ Gaithersburg, MD USA *
** E-mail to: bry@mnsinc.com *
*** ICQ 6124470 ***
** http://www.mnsinc.com/bry/ *
****
AM International #1024, TENTEN #13582. GRID FM19. Using a SWAN 250 on 6m,
Other rigs: Valiant, DX-60/HG-10, FT-840, TM-261A, Ameco TX-62, Gonset Comm. III
TEN-TEN #13582, DXCC #17,763 Bicentennial WAS

Date: Wed, 4 Feb 1998 10:34:48 -0500 (EST)
From: rdkeys@csemail.cropsci.ncsu.edu
Subject: CW power measurements etc....TNX for the discussion

Thanks all for the discussion. What was confusing me was the FCC definition, which after several careful retakes is just RMS power. Now it is clear as crystal.

One additional question surfaces..... mention was made of chirp giving rise to additional power beyond the average during the first cycle or two. I can see how key clicks (no on off transient shaping) could give rise to a spike of perhaps up to 10-20% more instantaneous power during the first cycle or two at key down. How would a chirp affect this?

Bob/NA4G

Date: Wed, 4 Feb 1998 10:57:49 -0500 (EST)
From: rdkeys@csemail.cropsci.ncsu.edu
Subject: Ancient 60cycle AC ammeters at RF --- yes/no?

In my junk box of RF ammeters, I have a couple dating from the 20's or maybe late teens that are marked as being usable for ac up to 2,000,000 cycles (call that 160M). This raises several questions.

1. I was reading in Ghirardi's Radio Physics Course (1933 ed), that AC ammeters could be used on DC to short waves with impunity. What effect would occur if 60 cycle meters were used on 160 or 80M? My gut feeling tells me that they should work fine, but perhaps the higher in frequency you go, the heating effect may be a little greater and the calibration may be off some, maybe giving rise to the 2,000,000 cycle rating on the meters.

2. Also reading in Ghirardi suggested that most RF ammeters were RMS calibrated devices. Other than comparing against known meters, how would one check this out? Some are apparently marked, but are there other indicators or constructional details that one should look at?

3. Thermocouple ammeters seem to be nothing but low-range galvanometers or dc microammeters with a series resistance and the thermocouple

junction. If one wanted to recalibrate these early meters for use on HF and rescale them perhaps, is there anything other than shunting the internal series resistance that one should be aware of?

The reasoning behind this is that those old meters sure do look nice, and would make a great output indicator on an early period glowbug panel set with something like a 211 or a 204A puffing away.

Bob/NA4G

Date: Wed, 4 Feb 1998 10:28:33 -0500
From: "Ornitz, Barry L" <ornitz@eastman.com>
Subject: RE: CW power measurements etc....TNX for the discussion

Bob,

Chirp is a form of frequency modulation, and while sidebands are produced, the PEP remains the same. Clicks, on the other hand, can increase the PEP. [Hint: Do a Fourier analysis of the product of a square wave and a sine wave. You get the carrier modulated by odd order harmonics of the keying frequency.]

Chirp and clicks are really dictated by bandwidth considerations. The FCC defines the appropriate tests - even to the keying speed for testing.

73, Barry WA4VZQ ornitz@eastman.com

> From: rdkeys@csemail.cropsci.ncsu.edu
> One additional question surfaces..... mention was made of chirp giving
> rise to additional power beyond the average during the first cycle or
> two. I can see how key clicks (no on off transient shaping) could
> give
> rise to a spike of perhaps up to 10-20% more instantaneous power
> during
> the first cycle or two at key down. How would a chirp affect this?
>
> Bob/NA4G

Date: Wed, 4 Feb 1998 11:36:59 -0500
From: "Ornitz, Barry L" <ornitz@eastman.com>
Subject: RE: CW power measurements etc....TNX for the discussion

I wrote:
> > Chirp and clicks are really dictated by
> bandwidth considerations. The FCC defines
> the appropriate tests - even to the keying
> speed for testing.

And Bob, NA4G, asked where this information can be found.

In 47CFR2.989 the measurements for occupied bandwidth are discussed. In 47CFR2.1005, amateur radio equipment is discussed.
Only type accepted equipment are required to meet the provisions of 2.981, 2.983, 2.991, 2.993, 2.997, 2.999, and 2.1001.

CFR is, of course, the Code of Federal Regulations. Title 47 is the section that deals with telecommunication. Most of the CFR's are available online.

73, Barry L. Ornitz WA4VZQ
ornitz@eastman.com

Date: Wed, 4 Feb 1998 12:20:28 -0500
From: "Ornitz, Barry L" <ornitz@eastman.com>
Subject: RE: Ancient 60cycle AC ammeters at RF --- yes/no?

Bob Keys, NA4G, wrote:
> In my junk box of RF ammeters, I have a
> couple dating from the 20's or maybe late teens that are marked as
> being usable for ac up to
> 2,000,000 cycles (call that 160M). This raises several questions.
These are not likely to work very well at higher frequencies. I will explain this below.
> 1. I was reading in Ghirardi's Radio Physics Course (1933 ed), that
> AC ammeters could be used on DC to short waves with impunity.
> What effect would occur if 60 cycle meters were used on 160 or
> 80M? My gut feeling tells me that they should work fine, but
> perhaps the higher in frequency you go, the heating effect may be
> a little greater and the calibration may be off some, maybe giving
> rise to the 2,000,000 cycle rating on the meters.
>
Remember these are thermocouple-type meters and NOT the normal moving vane AC ammeters which do not work at RF.

Thermocouple meters have a small current shunt inside through which the current to be measured is passed. This is often a tiny platinum wire. This wire is often coiled to get a higher resistance in a small space around the thermocouple. At higher frequencies, this inductance can alter the sensitivity. Capacitance to ground from the shunting resistor also creates problems.
>
> 2. Also reading in Ghirardi suggested that most RF ammeters were
> RMS calibrated devices. Other than comparing against known
meters, how would one check this out? Some are apparently
marked, but are there other indicators or constructional details that
one should look at?

Use the 50 ohm dummy load and the voltmeter circuit I described yesterday to check the calibration.

> 3. Thermocouple ammeters seem to be nothing but low-range
> galvanometers
> or dc microammeters with a series resistance and the thermocouple

> junction. If one wanted to recalibrate these early meters for
> use on HF and rescale them perhaps, is there anything other than
> shunting the internal series resistance that one should be aware
> of?
>
See the description above for what is really in the meter. The
thermocouple output is proportional to its temperature (but since you
have no reference junction room temperature affects the calibration).
Putting more current through the shunt, and increasing the series
resistance from the thermocouple is asking for the shunt to be
destroyed. Any time you change the resistances, the sensitivity is
changes - but you also change the shape of the scale too!

> The reasoning behind this is that those old meters sure do look nice,
> and would make a great output indicator on an early period glowbug
> panel set with something like a 211 or a 204A puffing away.
>
> Bob/NA4G
>
Bleech - how I hate Micros**t Access!.. Trying to quote text properly
is next to impossible. The UNIX folks have it right!
Sorry if the quoting in this message is garbled.

Bob, I would test the meters using the 6AL5 and a VTVM with your dummy
load. I would not try to modify them, but you might consider drawing a
new scale.

73, Barry WA4VZQ ornitz@eastman.com

Date: Wed, 4 Feb 1998 11:07:05 -0800
From: "Eugene D. Brooks III" <brooks3@llnl.gov>
Subject: regenerative set

A quick glowbug question. Is there a best choice for a tube
and socket for a homebrew regenerative set these days? A source
for the tube, socket and specs are important. The kits available
are transistorized, and I think that won't present the correct look
and feel to my 11 year old.

Please forward the reply on direct email if you can.

Eugene

- --

Eugene D. Brooks III
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End of glowbugs V1 #237
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